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ABSTRACT

The general purpose of the occupational analysis is to provide workable, basic information dealing with the many and varied duties performed in the telecommunications occupation. The telecommunications job cluster includes such areas as the telephone, two-way radio, cable TV, data transfer, teletype, and other allied fields. The document opens with a brief introduction followed by a job description. The bulk of the document is presented in table form. Seven duties are broken down into a number of tasks and for each task a table is presented, showing: tools, equipment, materials, objects acted upon; performance knowledge; safety--hazard; science; math--number systems; and communications. The duties include: install framework; mount equipment and apparatus; run cables and connect wires; perform basic tests on equipment; perform complex tests; troubleshoot equipment; and perform maintenance, modification, and repair of equipment. (BP)

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TELECOMMUNICATIONS

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Instructional Materials Laboratory
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AN ANALYSIS OF THE TELECOMMUNICATIONS OCCUPATION

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FOREWORD

The occupational analysis project was conducted by The Instructional Materials Laboratory, Trade and Industrial Education, The Ohio State University in conjunction with the State Department of Education, Division of Vocational Education pursuant to a grant from the U.S. Office of Education.

The Occupational Analysis project was proposed and conducted to train vocational educators in the techniques of making a comprehensive occupational analysis. Instructors were selected from Agriculture, Business, Distributive, Home Economics, and Trade and Industrial Education to gain experience in developing analysis documents for sixty-one different occupations. Representatives from Business, Industry, Medicine, and Education were involved with the vocational instructors in conducting the analysis process.

The project was conducted in three phases. Phase one involved the planning and development of the project strategies. The analysis process was based on sound principles of learning and behavior. Phase two was the identification, selection and orientation of all participants. The training and workshop sessions constituted the third phase. Two-week workshops were held during which teams of vocational instructors conducted an analysis of the occupations in which they had employment experience. The instructors were assisted by both occupational consultants and subject matter specialists.

The project resulted in producing one hundred two trained vocational instructors capable of conducting and assisting in a comprehensive analysis of various occupations. Occupational analysis data were generated for sixty-one occupations. The analysis included a statement of the various tasks performed in each occupation. For each task the following items were identified: tools and equipment; procedural knowledge; safety knowledge; concepts and skills of mathematics, science and communication needed for successful performance in the occupation. The analysis data provided a basis for generating instructional materials, course outlines, student performance objectives, criterion measures, as well as identifying specific supporting skills and knowledge in the academic subject areas.

PREFACE

In this document we have described the job, duties and tasks from a behavioral standpoint, analyzing it as to what the worker does, what mental processes he uses, and how he reacts to the work situation.

Specifically, we have chosen a job cluster and called it telecommunications, defining it as the area of telephones, two-way radio, cable TV, data transfer, teletype, facsimile and other allied fields.

We have analyzed this job cluster, using the above criteria and feel that this analysis documents the performance skills necessary for the individual to function as a craftsman.

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JOB DESCRIPTION

The telecommunications specialist installs and modifies telephone, two-way radio, cable TV, data teletype, facsimile and other systems that deal with the transmission of intelligence over a distance. He/she checks completed systems to determine that operation is within specified parameters, using electronic test equipment and hand tools; physically inspects, cleans and measures operating systems, makes adjustments and replacements, using electronic test equipment and hand tools as required. The specialist analyzes failures and causes, replaces faulty components or modules and returns system to specified operating parameters.

Duty A

Install Framework

- 1 Determine material needs
- 2 Obtain material
- 3 Determine location
- 4 Drill holes and cut material
- 5 Assemble framework

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

PERFORMANCE KNOWLEDGE

SAFETY - HAZARD

SPECIFICATIONS
PRINTS
REQUISITIONS

RULER
TAPE
CHALK LINE
PLUMB BOB
LADDERS
HARD HAT
SAFETY GLASSES

IDENTIFY TYPES & STYLES OF,
HARDWARE
FASTENERS
STRUCTURAL MATERIAL
PIPE & CONDUIT

RECOGNIZE AND IDENTIFY EACH UNIT C
PART BY SYMBOL OR CODE ASSIGNED

LADDER
ENVIRONMENTAL OBSTRUCTIONS

SCIENCE

ARRANGEMENT OF MOLECULES, ATOMS AND IONS
AND THE EFFECT ON STRUCTURE AND STRENGTH OF
MATERIAL

[VALUE JUDGMENT-STRENGTH OF MATERIALS]

RESISTANCE OF MATERIALS TO CHANGE IN SHAPE
(Examples: BENDING, TWISTING, STRETCHING.)

MATH - NUMBLR SYSTEMS

ADDITION AND SUBTRACTION OF WHOLE NUMBERS
MEASURES OF LENGTH (Examples: INCH, FEET,
ETC.)

[STANDARD RULER TO 1/8"]

READ AND INTERPRET CHARTS, TABLES
AND/OR GRAPHS

MEASURES OF WEIGHT
[VISUAL ESTIMATE]

COMMUNICATIONS

READING COMPREHENSION
[BLUEPRINT COMPREHENSION]

RECOMMENDATION REPORT - ORAL
[INFORMAL ORAL RECOMMENDATION REPORTS]

TECHNICAL TERMINOLOGY,
[VOCABULARY - TECHNICAL, ABBREVIATION
COMPLETING REQUISITION]

PENMANSHIP

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
<p>REQUISITIONS PURCHASE ORDERS PACKING SLIPS SHIPPING INVOICES BILLS OF LADING DOLLIES HAND TRUCKS CHARTS HAMMER RIPPING CHISEL CUTTERS METAL BAND STRUCTURAL MATERIALS FASTENERS HARDWARE SHORTAGE REPORTS CLAIMS PIPE AND CONDUIT</p>	<p>IDENTIFY TYPES AND STYLES OF: HARDWARE FASTENERS STRUCTURAL MATERIAL PIPE AND CONDUIT</p> <p>RECOGNIZE AND IDENTIFY EACH UNIT OF PART BY SYMBOL OR CODE ASSIGNED</p>	<p>PACKING MATERIAL REFUSE MATERIAL HANDLING TECHNIQUE HAND TRUCK, DOLLY LIFTING</p>
SCIENCE	MATH — NUMBER SYSTEMS	COMMUNICATIONS
<p>ARRANGEMENT OF MOLECULES, ATOMS AND IONS AND THE EFFECT ON STRUCTURE AND STRENGTH OF MATERIALS (VALUE-JUDGMENT—STRENGTH OF MATERIALS)</p> <p>RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Examples: BENDING, TWISTING, STRETCHING.)</p> <p>SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE (Examples: LEVERS, GEARS, PULLEYS)</p>	<p>ADDITION AND SUBTRACTION OF WHOLE NUMBERS</p> <p>MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) (STANDARD RULER TO 1/8")</p> <p>READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS</p> <p>MEASURES OF WEIGHT (VALUE JUDGMENT)</p> <p>NUMBERING SCHEME (UNITS, TENS, DOZEN, GROSS)</p>	<p>READING COMPREHENSION (BLUEPRINT & DRAWING COMPREHENSION)</p> <p>RECOMMENDATION REPORT - ORAL (INFORMAL ORAL RECOMMENDATIONS & REPORTS)</p> <p>TECHNICAL TERMINOLOGY (VOCABULARY - TECHNICAL; ABBREVIATION COMPLETING REPORTS)</p> <p>PEN: P</p>

TASK STATEMENT) DETERMINE LOCATION FOR FRAME WORK

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

TAPES
RULERS
PLUMB BOBS
LEVELS
CHALK LINES
STRAIGHT EDGE
LADDERS
HARD HAT
SAFETY GLASSES
SQUARE
MARKING DEVICES
SPECIFICATIONS
BLUEPRINTS
DRAWINGS

PERFORMANCE KNOWLEDGE

CONCEPTUAL RELATIONSHIPS BETWEEN THE PLANES
OF RELATED STRUCTURAL MATERIAL
MINOR DRAFTING SKILLS
MAKE PROPER MARKS TO INDICATE POSITION
OF HANGERS, ANCHORS, FASTENERS, ETC.

SAFETY - HAZARD

LADDER
ENVIRONMENTAL OBSTRUCTIONS

SCIENCE

NONE

MATH - NUMBER SYSTEMS

ADDITION AND SUBTRACTION OF WHOLE NUMBERS
MULTIPLICATION AND DIVISION WITH WHOLE NUMBERS
REDUCTION OF FRACTIONS (Example $12/16 = 3/4$)
ADDITION AND SUBTRACTION OF PROPER (example: $3/4$)
AND IMPROPER (example: $11/8$) FRACTIONS.
MULTIPLICATION AND DIVISION OF PROPER AND
IMPROPER FRACTIONS
CHANGING MIXED NUMBERS TO IMPROPER FRACTIONS
(Example $4\frac{3}{4} = 19/4$)
ADDITION AND SUBTRACTION OF DECIMAL FRACTIONS
MULTIPLICATION AND DIVISION OF DECIMAL
FRACTIONS
MEASURES OF LENGTH (Example: INCHES, FEET, ETC.)
[STANDARD RULER TO $1/32"$]
ROUNDING OFF DECIMALS AND WHOLE NUMBERS
(Example: $4877 = 488$ when round to three decimal places.)
READ AND INTERPRET CHARTS, TABLES AND/OH
GRAPHS

COMMUNICATIONS

READING COMPREHENSION
(BLUEPRINT COMPREHENSION)
RECOMMENDATION REPORT - ORAL
(INFORMAL ORAL RECOMMENDATIONS AND
REPORTS)

TASK STATEMENT) DRILL HOLES AND CUT MATERIAL FOR FRAME WORK

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
SPECIFICATION, DRAWINGS, BLUEPRINTS ELECTRIC DRILLS ELECTROPNEUMATIC HAMMER DRILL CENTER PUNCH HAMMERS TWIST BITS CARBOLLOY BITS WOOD BITS HARD-HAT SAFETY GLASSES HOLE PUNCHES TAP SET LADDER SCAFFOLDING SAWS	CHOICE OF DRILLING INSTRUMENT TO MATCH- COMPOSITION OF MATERIAL RECOGNIZE POSITIONAL MARKS DETERMINE DIAMETER AND DEPTH OF HOLE RELATIONSHIP OF DRILL BIT SIZE TO FASTENER USED CHOOSE PROPER SIZE DRILL AND TAP TO MATCH FASTENER	DO NOT DRILL THROUGH ANYTHING WITHOUT KNOWING WHAT IS BEHIND THE SURFACE; POSSIBLE DAMAGE TO MATERIALS, PERSONNEL EQUIPMENT LADDER AND SCAFFOLDING
SCIENCE	MATH -- NUMBER SYSTEMS	COMMUNICATIONS
EFFECTS OF FRICTION ON WORK PROCESSES AND PRODUCT QUALITY [DRILLING] SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE. (Examples: LEVERS, GEARS, PULLEYS.)	MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER 1/32"] READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT COMPREHENSION]

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

HAMMER
HACK SAW
SCREW DRIVER
SOCKET SET
ADJ. WRENCH
OPEN END WRENCH
LEVEL
SQUARE
PLUMB BOB
MALLET
FILE
PLIERS
DRIFT PINS
TAPE
RULER
ROPE AND CHAIN HOISTS
SAFETY GLASSES
HARD HAT
LADDER
SCAFFOLDING

SPECIFICATIONS
BLUEPRINTS
DRAWINGS

PERFORMANCE KNOWLEDGE

RECOGNIZE AND IDENTIFY EACH UNIT OR PART
BY SYMBOL OR CODE ASSIGNED
CONCEPTUALIZE LOGICAL SEQUENCE OF ASSEMBLY
CONCEPT OF ABSTRACT RELATIONSHIPS VARYING
FROM SITUATION TO SITUATION
THE STRATEGY OF CONCEPTUALIZING THE ABSTRACT
RELATIONSHIP OF PARTS TO THEIR WHOLE
MINOR DRAFTING SKILLS

SAFETY -- HAZARD

SHARP EDGES
PUNCTURE WOUNDS
WEIGHT, LIFTING AND PULLING
LADDERS AND SCAFFOLDING

SCIENCE

SIMPLE MACHINES USED TO GAIN MECHANICAL
ADVANTAGE (Example: LEVERS, GEARS, PULLEYS)

METALLURGY -- LIMITED TO
RIGIDITY
TENSILE STRENGTH
ELASTICITY
YIELD

MATH -- NUMBER SYSTEMS

READ AND INTERPRET CHARTS, TABLES
AND/OR GRAPHS

MEASURES OF WEIGHTS
[VISUAL ESTIMATE]

MEASURES OF LENGTH (Examples: INCHES, FEET, ETC.)
[STANDARD RULER TO 1/32"]

COMMUNICATIONS

READING COMPREHENSION
[BLUEPRINT COMPREHENSION]
INTERPRET CONCEPTUAL DRAWINGS

Duty B

Mount Equipment and Apparatus

- 1 Inventory equipment
- 2 Determine mounting location
- 3 Select proper unit for location
- 4 Mount and secure units and apparatus
- 5 Identify and designate equipment

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

SAFETY - HAZARD

PERFORMANCE KNOWLEDGE

PENCIL
STOCK LIST
SHIPPING LIST
SPECIFICATIONS
PARTS LIST

BOX OPENER
CUTTER, STEEL BANO
HAMMER
RIPPING CHISEL
TAPE MEASURE

RECOGNIZE AND IDENTIFY EACH UNIT OR PART BY
SYMBOL OR CODE ASSIGNED

PACKING MATERIAL REFUSE
MATERIAL HANDLING TECHNIQUES
HAND TRUCKS, DOLLIES
WEIGHT, LIFTING AND PULLING

SCIENCE

SIMPLE MACHINES USED TO GAIN MECHANICAL
ADVANTAGE (Example: LEVERS, GEARS, PULLEYS.)

MATH - NUMBER SYSTEMS

READ AND INTERPRET CHARTS, TABLES
AND/OR GRAPHS
NUMBERING SCHEME
(UNITS, TENS, OZEN, GROSS)

COMMUNICATIONS

READING COMPREHENSION
(BLUEPRINT COMPREHENSION)
TECHNICAL TERMINOLOGY
(VOCABULARY, ABBREVIATIONS, TECHNOLOGY)
COMPLETING REPORTS
PENMANSHIP
INTERPRETING PARTS LIST

TASK STATEMENT) TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
<p>MARKING INSTRUMENTS RULER TAPE MEASURE LEVEL SQUARE</p> <p>SPECIFICATIONS DRAWINGS MANUALS</p>	<p>LOGICAL SEQUENCE</p> <p>THE STRATEGY OF CONCEPTUALIZING THE ABSTRACT OF PARTS TO THEIR WHOLE</p>	<p>NONE</p>
<p>SCIENCE</p>	<p>MATH – NUMBER SYSTEMS</p>	<p>COMMUNICATIONS</p>
<p>NONE</p>	<p>ADDITION AND SUBTRACTION OF WHOLE NUMBERS</p> <p>MULTIPLICATION AND DIVISION WITH WHOLE NUMBERS</p> <p>REDUCTION OF FRACTIONS (Example: $12/16 = 3/4$)</p> <p>ADDITION AND SUBTRACTION OF PROPER (example $3/4$) AND IMPROPER (example $11/8$) FRACTIONS</p> <p>MULTIPLICATION AND DIVISION OF PROPER AND IMPROPER FRACTION</p> <p>ADDITION AND SUBTRACTION OF DECIMAL FRACTIONS</p> <p>MEASURES OF LENGTHS (Example: INCHES, FEET, ETC.) [STANDARD RULER TO $1/32$"]</p> <p>READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS</p>	<p>READING COMPREHENSION (BLUEPRINT AND DRAWING COMPREHENSION)</p> <p>TECHNICAL TERMINOLOGY (VOCABULARY, ABBREVIATIONS, TECHNOLOGY)</p>

TASK STATEMENT) SELECT PROPER UNIT FOR LOCATION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
UNITS AND APPARATUS MARKING INSTRUMENTS TAGS SPECIFICATIONS DRAWINGS MANUALS	RECOGNIZE AND IDENTIFY EACH UNIT OR PART BY SYMBOL OR CODE ASSIGNED LOGICAL SEQUENCE THE STRATEGY OF CONCEPTUALIZING THE ABSTRACT PARTS TO THEIR WHOLE	NONE
SCIENCE	MATH -- NUMBER SYSTEMS	COMMUNICATIONS
NONE	READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT COMPREHENSION] TECHNICAL TERMINOLOGY [TECHNICAL VOCABULARY AND ABBREVIATIONS]

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

SAFETY -- HAZARD

PERFORMANCE KNOWLEDGE

SCIENCE

MATH -- NUMBER SYSTEMS

COMMUNICATIONS

ROPES AND HOISTS
SCREW DRIVERS
WRENCHES
DRIFT PINS
FASTENERS
UNITS AND APPARATUS
LADDERS AND SCAFFOLDS
HARD HAT AND SAFETY GLASSES

SPECIFICATIONS
BLUEPRINTS
DRAWINGS

RECOGNIZE AND IDENTIFY EACH UNIT OR PART
BY SYMBOL OR CODE ASSIGNED

LOGICAL SEQUENCE

THE STRATEGY OF CONCEPTUALIZING THE ABSTRACT
PARTS TO THEIR WHOLE

LIFTING HEAVY UNITS
LADDERS AND SCAFFOLDING

HAZARD TO DELICATE APPARATUS DUE TO
PHYSICAL SHOCK OR ABUSE

SIMPLE MACHINES USED TO GAIN MECHANICAL
ADVANTAGE (Example: LEVERS, GEARS, PULLEYS)

METALLURGY -- TENSION AND STRESS IN FASTENERS

READ AND INTERPRET CHARTS, TABLES AND/OR
GRAPHS

INTERPRET DESIGNATIONS OR MARKS ON
FRAME WORK AND DRAWINGS
READING COMPREHENSION
[BLUEPRINT AND DRAWING COMPREHENSION]
TECHNICAL TERMINOLOGY
[VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

**TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON**

INK STENCILS
RUBBER STAMPS
TYPED DESIGNATION STRIPS
DECALS
TRANSFERS
NAME AND LETTER PLATES
EQUIPMENT AND APPARATUS
SOLVENTS
ADHESIVES
RULER
SQUARE
SPECIFICATIONS
BLUEPRINTS
DRAWINGS

SAFETY – HAZARD

SOLVENT VAPORS
ADHESIVE VAPORS

PERFORMANCE KNOWLEDGE

LOCATE CENTERS AND OFFSETS FOR PLACEMENT
OF DESIGNATIONS
LOGICAL SEQUENCE

SCIENCE

CHEMISTRY, BASIC SOLVENTS AND ADHESIVES

MATH – NUMBER SYSTEMS

ADDITION AND SUBTRACTION OF WHOLE NUMBERS
MULTIPLICATION AND DIVISION OF WHOLE NUMBERS
MEASURES OF LENGTH (Example: INCHES, FEET, ETC.)
[STANDARD RULER TO 1/16"]
READ AND INTERPRET CHARTS, TABLES, AND/OR
GRAPHS

COMMUNICATIONS

READING COMPREHENSION
[BLUEPRINT AND DRAWING COMPREHENSION]
TECHNICAL TERMINOLOGY
[VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

Duty C

Run Cables and Connect Wires

- 1 Select cable and wire
- 2 Determine and prepare cable and wire route
- 3 Cut and identify cables and wires
- 4 Run cables and wires
- 5 Secure cables and wires
- 6 Butt and strip cable
- 7 Fan conductors
- 8 Form conductors
- 9 Strip and connect conductors
- 10 Climb poles/towers

TASK STATEMENT)

SELECT CABLE AND WIRE

**TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON**

SPECIFICATIONS
MANUALS
DRAWINGS
WIRE LIST
WIRES
CABLES

PERFORMANCE KNOWLEDGE

RECOGNIZE OR IDENTIFY CABLE OR WIRE BY
SYMBOLS OR CODES ASSIGNED
(EXAMPLE: RG-8 COAXIAL CABLE, RWH no. 14 Ga
600V WIRE)

RECOGNIZE PHYSICAL DIFFERENCE BETWEEN SINGLE,
PAIRED OR QUADED CONDUCTOR WIRES

SELECT OR CHOOSE PROPER GAUGE OF CONDUCTOR
FOR A SPECIFIC CURRENT OR A MINIMUM VOLTAGE
DROP PER UNIT LENGTH

SAFETY - HAZARD

NONE

SCIENCE

RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL
CURRENT
(ELECTRICAL CONDUCTORS)

MATH - NUMBER SYSTEMS

CIRCULAR MIL AREA, i.e. 700,000 cm²

WIRE GAUGE i.e. no. 10 AWG

COMMUNICATIONS

READING COMPREHENSION
(BLUEPRINT AND DRAWING COMPREHENSION)

TECHNICAL TERMINOLOGY
(VOCABULARY, ABBREVIATIONS, TECHNOLOGY)

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

SPECIFICATIONS, DRAWING, BLUEPRINTS
ELECTRIC DRILL
ELECTROPNEUMATIC HAMMER DRILL
CENTER PUNCH
HAMMERS
TWIST BITS
CARBOLLOY BITS
WOOD BITS
HARD HAT
SAFETY GLASSES
HOLE PUNCHES
TAP SET
LADDER
SCAFFOLDING
SAWS
SCREWDRIVERS
WRENCHES
HACK SAW
DRILL AND BITS
CABLE CLAMPS AND SUPPORTING DEVICES
BUSHINGS, GROMMETS, INSULATORS

PERFORMANCE KNOWLEDGE

CHOICE OF DRILLING INSTRUMENT TO MATCH
COMPOSITION OF MATERIAL
RECOGNIZE POSITIONAL MARKS
DETERMINE DIAMETER AND DEPTH OF HOLE
RELATIONSHIP OF DRILL BIT SIZE TO FASTENER USED
CHOOSE PROPER SIZE DRILL AND TAP TO MATCH
FASTENER
RECOGNIZE AND IDENTIFY EACH UNIT OR PART
BY SYMBOL OR CODE ASSIGNED
LOGICAL SEQUENCE
THE STRATEGY OF CONCEPTUALIZING THE
ABSTRACT PARTS TO THEIR WHOLE

SAFETY - HAZARD

DO NOT DRILL THROUGH ANYTHING WITHOUT
KNOWING WHAT IS BEHIND THE SURFACE;
POSSIBLE DAMAGE TO MATERIALS, PERSONNEL
EQUIPMENT

LADDER AND SCAFFOLDING

SCIENCE

MATH - NUMBER SYSTEMS

READ AND INTERPRET CHARTS,
TABLES AND/OR GRAPHS

COMMUNICATIONS

READING COMPREHENSION
[BLUEPRINT AND DRAWING COMPREHENSION]
TECHNICAL TERMINOLOGY
[VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
SPECIFICATIONS MANUALS DRAWINGS WIRE LIST WIRES CABLE CABLE AND WIRE MARKING DEVICES (TAGS-TIE ONS, ETC.) MARKING INSTRUMENTS TAPE MEASURE CABLE AND WIRE CUTTERS	KNOWLEDGE OF KNOTS AND SECURING TECHNIQUES	CUTTING DEVICES
SCIENCE	MATH - NUMBER SYSTEMS	COMMUNICATIONS
NONE	READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) (STANDARD RULER TO 1/32")	READING COMPREHENSION (BLUEPRINT AND DRAWING COMPREHENSION), TECHNICAL TERMINOLOGY (VOCABULARY, ABBREVIATION, TECHNOLOGY)

**TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON**

BLUEPRINTS
DRAWINGS
CABLE AND WIRE
MARKING DEVICES
FRAME WORK
EQUIPMENT

CABLE AND WIRE CUTTERS
LADDERS
SCAFFOLDS
FISH TAPES
HARD HAT
SAFETY GLASSES
WIRE LUBRICANT
ELECTRICAL TAPE
PULLEYS AND ROPES
WINCHES

PERFORMANCE KNOWLEDGE

LOGICAL SEQUENCE
ROUTE
TYPES OF CABLE/WIRE

HANDLING OF LOOSE WIRES TO PREVENT TANGLING,
KINKING AND DAMAGE

SAFETY - HAZARD

WIRE ENDS
LADDERS
CUTTERS

SCIENCE

SIMPLE MACHINES USED TO GAIN MECHANICAL
ADVANTAGE (Example: LEVERS, GEARS, PULLEYS)

WORK INPUT, WORK OUTPUT, FRICTION AND EFFICIENCY
IN SIMPLE MACHINES

METALLURGY - TENSILE STRENGTH OF WIRES/CABLES

EFFECTS OF FRICTION ON WORK PROCESSES AND PRODUCT
QUALITY
(WIRE OR CABLE TO CONDUIT IRONWORK AND
OTHER CONDUCTORS)

RESISTANCE OF MATERIALS TO CHANGE IN SHAPE
(Example: BENDING, TWISTING, STRETCHING)

MATH - NUMBER SYSTEMS

MEASURES OF LENGTHS (Example: INCHES, FEET, ETC.)
(STANDARD RULER TO 1/32")

READ AND INTERPRET CHARTS,
TABLES, AND/OR GRAPHS

COMMUNICATIONS

READING COMPREHENSION
(BLUEPRINT AND DRAWING COMPREHENSION)

TECHNICAL TERMINOLOGY
(VOCABULARY, ABBREVIATIONS, TECHNOLOGY)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
<p>CABLE AND WIRE SECURING DEVICES SUCH AS CLIPS, CLAMPS, CORD AND TWINE, STRAPS, TAPE, ETC.</p> <p>CUTTERS LADDERS SCAFFOLDING HARD HAT SAFETY GLASSES PLIERS SCREW DRIVERS FASTENERS CABLE SEWING NEEDLES</p>	<p>KNOWLEDGE OF KNOTS AND SECURING TECHNIQUES</p>	<p>CUTTERS LADDERS SCAFFOLDING</p>
SCIENCE	MATH - NUMBER SYSTEMS	COMMUNICATIONS
<p>RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Example: BENDING, TWISTING, STRETCHING)</p> <p>RELATIONSHIP OF FORCE TO DISTORTION IN AN ELASTIC BODY</p>	<p>MEASURES OF LENGTHS (Example: INCHES, FEET, ETC.) (STANDARD RULER TO 1/32")</p>	<p>READING COMPREHENSION (BLUEPRINT AND DRAWING COMPREHENSION)</p> <p>TECHNICAL TERMINOLOGY (VOCABULARY, ABBREVIATION, TECHNOLOGY)</p>

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
<p>BLUEPRINTS DRAWINGS CABLE AND WIRE MARKING DEVICES FRAME WORK EQUIPMENT</p> <p>CABLE AND WIRE CUTTERS LADDERS SCAFFOLDS HARD HAT SAFETY GLASSES ELECTRICAL TAPE KNIVES STRIPPING TOOLS</p>	<p>LOGICAL SEQUENCE</p> <p>THICKNESS OF INSULATION TO PREVENT DAMAGE TO INTERNAL CONDUCTORS</p>	<p>LADDERS WIRE ENDS</p>
SCIENCE	MATH - NUMBER SYSTEMS	COMMUNICATIONS
<p>RELATIONSHIPS OF FORCE TO DISTORTION IN AN ELASTIC BODY</p> <p>RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Example: BENDING, TWISTING, STRETCHING)</p>	<p>MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"]</p> <p>READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS</p>	<p>READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION]</p> <p>TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATION, TECHNOLOGY]</p>

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
SPECIFICATIONS MANUALS DRAWINGS WIRE LIST WIRES CABLES LADDERS STOOLS SCAFFOLDING FANING AND FORMING TOOLS BENDING HICKEYS CABE AND WIRE CUTTERS HARD HAT SAFETY GLASSES	RECOGNIZE OR IDENTIFY CABLE OR WIRE BY SYMBOL OR CODE ASSIGNED DISCRIMINATE BETWEEN MULTIPLE COMBINATIONS OF COLOR CODING ON THE WIRES OF MULTIPLE CONDUCTOR CABLES USING A VARIETY OF COLOR COMBINATIONS CUE: COLOR BLINDNESS! LOGICAL SEQUENCE CONCEPT OF ABSTRACT RELATIONSHIP VARYING FROM SITUATION TO SITUATION CUE: CHECK NUMBERING SEQUENCE AND ORDER IN EACH SPECIFIC INSTANCE	WIRE ENDS LADDERS AND SCAFFOLDING CUTTERS
SCIENCE	MATH - NUMBER SYSTEMS	COMMUNICATIONS
RELATIONSHIP OF FORCE TO DISTORTION IN AN ELASTIC BODY RESISTANCE OF MATERIAL TO CHANGE IN SHAPE (Example: BENDING, TWISTING, STRETCHING)	MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"] READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
<p>CABLE AND WIRE SECURING DEVICES SUCH AS CLIPS, CLAMPS, CORD AND TWINE, STRAPS, TAPE, ETC.</p> <p>CUTTERS LADDERS SCAFFOLDING HARD HAT SAFETY GLASSES PLIERS SCREWDRIVERS FASTENERS CABLE SEWING NEEDLES STOOLS FANNING & FORMING TOOLS BENDING HICKEYS CABLE AND WIRE CUTTERS</p>	<p>KNOWLEDGE OF KNOTS AND SECURING TECHNIQUES LOGICAL SEQUENCE ROUTE TYPES OF CABLE/WIRE HANDLING OF LOOSE WIRES TO PREVENT TANGLING, KINKING AND DAMAGE RECOGNIZE OR IDENTIFY CABLE OR WIRE BY SYMBOL OR CODE ASSIGNED DISCRIMINATE BETWEEN MULTIPLE COMBINATIONS OF COLOR CODING ON THE WIRES OF MULTIPLE CONDUCTOR CABLES USING A VARIETY OF COLOR COMBINATIONS. CUE: COLOR BLINDNESS! LOGICAL SEQUENCE CONCEPT OF ABSTRACT RELATIONSHIPS VARYING FROM SITUATION TO SITUATION. CUE: CHECK NUMBERING SEQUENCE AND ORDER IN EACH SPECIFIC INSTANCE RECOGNIZE AND IDENTIFY TERMINALS, CONNECTORS AND LUGS ON APPARATUS AND CABLES THAT VARIES FROM SITUATION TO SITUATION</p>	<p>WIRE ENDS LADDERS AND SCAFFOLDING CUTTERS</p>
SCIENCE	MATH - NUMBLR SYSTEMS	COMMUNICATIONS
<p>RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Example: BENDING, TWISTING, STRETCHING)</p> <p>RELATIONSHIP OF FORCE TO DISTORTION IN AN ELASTIC BODY</p> <p>MOTION RESULTING FROM TWO OR MORE FORCES ACTING ON A POINT IN A BODY</p>	<p>MEASURING IN LENGTHS (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"]</p> <p>READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS</p>	<p>READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION]</p> <p>TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATION, TECHNOLOGY]</p>

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Cable and wire securing devices such as clips, clamps, cord and twine, straps, tape, etc.
Cutters
Ladders
Scaffolding
Hard hat
Safety glasses
Pliers
Screwdrivers
Fasteners
Cable sewing needles
Blueprints
Connecting charts
Wiring sketches
Soldering iron
Grimping devices
Wire wrap tool
Allen wrenches
Wire stripping tools
Lugs and terminals
Wrenches

Recognize or identify cable or wire by symbol or code assigned
Discriminate between multiple combinations of color coding on the wires of multiple conductor cables using a variety of color combinations, Cue: color blindness
Know logical sequence
Know concepts of abstract relationships varying from situation to situation; Cue: check numbering sequence and order in each specific instance
Handling of loose wires to prevent tangling, kinking and damage
Discrimination of the appearance, position and condition of the wire and associated lug to conform to acceptable quality standards (National Electric Code, MIL specifications, etc.)
Have concepts and develop strategies to perform operations in a manner to safeguard equipment and service
Perform critical visual and tactile discrimination on the following:
Coaxial connectors and conductors
Compression fittings
Solder lugs
Clamps
Swages fittings, e.g., amp lugs

Electrical shock
Burns
Electrical damage to apparatus

SAFETY - HAZARD

SCIENCE

Effects of heating and cooling on expansion of materials (change of dimensions)
Effects of heating and cooling on state of matter (change of matter from one form to another)
Transfer of heat from one body to another
Effects of friction on work processes and product quality
Relationship of force to distortion in an elastic body (wire conductors only)
Metallurgy—solder, oxidation

MATH - NUMBLR SYSTEMS

Measures of length
(standard ruler to 1/32")
Read and interpret charts, tables and/or graphs

COMMUNICATIONS

Reading comprehension
(Blueprint and drawing comprehension)
Technical terminology
(Vocabulary, abbreviation, technology)

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

BODY BELT
CLIMBERS
GLOVES GAUNLET
HARD HAT
LONG SLEEVE SHIRT
HIGH SHOES OR BOOTS
POLE PROD
AC.GROUND ROD TESTER
GIN POLE
ROPE AND PULLEYS
HARD HAT AND GLASSES
RUBBER GOODS (GLOVES, BLANKETS)
HOT STICK
HAMMER
WRENCHES
SCREWDRIVERS
PLIERS
DRILLS AND BITS
SAW
FILE
SPUR GAUGE

SAFETY - HAZARD

ELECTRICAL SHOCK
ENVIRONMENTAL OBSTRUCTIONS
CHEMICAL BURNS
PUNCTURE WOUNDS (SPLINTERS)

PERFORMANCE KNOWLEDGE

CARE OF CLIMBERS STRAPS AND BODY BELT
BE ABLE TO DETERMINE THE "CONDITION" OF A POLE
OR TOWER BY VISUAL AND TACTILE INSPECTION
LOCATING AND MOUNTING OF EQUIPMENT,
APPARATUS, CABLES, GUY WIRES, ETC

SCIENCE

SIMPLE MACHINES USED TO GAIN MECHANICAL
ADVANTAGE (Example: LEVERS, GEARS, PULLEYS)
(MOMENT OF FORCE, STATICS, VECTOR NATURE OF A
FORCE)

MATH - NUMBLR SYSTEMS

ADDITION AND SUBTRACTION OF WHOLE NUMBERS
MEASURES OF LENGTH (Example: INCHES, FEET, ETC.)
UNDERSTANDING AND USE OF THE PYTHAGOREAN
THEOREM, BASED ON THE RIGHT TRIANGLE
Example: $a^2 + b^2 = c^2$
USE OF TRIGONOMETRIC FUNCTIONS IN SOLUTION
OF PROBLEMS INVOLVING RIGHT TRIANGLES

COMMUNICATIONS

READING COMPREHENSION
(BLUEPRINT AND DRAWING COMPREHENSION)
TECHNICAL TERMINOLOGY
(VOCABULARY, ABBREVIATION, TECHNOLOGY)
RECOMMENDATION REPORT - ORAL
(INFORMAL ORAL RECOMMENDATIONS AND
REPORTS)

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

BUZZERS
LIGHTS
OHM METERS
LADDERS
STOOLS
SCAFFOLDING
HARD HAT
SAFETY GLASSES
DRAWINGS
WIRING SWITCHES
MANUALS
SPECIFICATIONS

PERFORMANCE KNOWLEDGE

RECOGNIZE OR IDENTIFY CABLE OR WIRE BY SYMBOL OR CODE ASSIGNED
LOGICAL SEQUENCE
DISCRIMINATE BETWEEN MULTIPLE COMBINATIONS OF COLOR CODING ON THE WIRES OF MULTIPLE CONDUCTOR CABLES USING A VARIETY OF COLOR COMBINATIONS. CUE: COLOR BLINDNESS!
ANALYZE TROUBLE INDICATIONS TO MARK DETAILED ENTRIES ON TEST RECORDS OR TROUBLE REPORTS
CONCEPT OF ABSTRACT RELATIONSHIPS VARYING FROM SITUATION TO SITUATION
CUE: CHECK NUMBERING SEQUENCE AND ORDER IN EACH SPECIFIC INSTANCE
DISCRIMINATION OF THE APPEARANCE POSITION AND CONDITION OF THE WIRE AND ASSOCIATED LUG TO CONFORM TO ACCEPTABLE QUALITY STANDARDS
HAVE CONCEPTS AND DEVELOP STRATEGIES TO PERFORM OPERATIONS IN A MANNER TO SAFE-GUARD EQUIPMENT AND SERVICE.

SAFETY - HAZARD

HAZARDOUS VOLTAGES AND CURRENTS
LADDERS AND SCAFFOLDS

SCIENCE

RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL CURRENT

MATH - NUMBLR SYSTEMS

READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS
GIVEN AN INSTRUMENT OF MEASURE, DETERMINE PRECISION AND/OR ACCURACY WITH RESPECT TO RELATIVE ERROR, SIGNIFICANT DIGITS AND TOLERANCE
(CONTINUITY ONLY)

COMMUNICATIONS

READING COMPREHENSIONS
(BLUEPRINT AND DRAWING COMPREHENSION)
RECOMMENDATION REPORT - ORAL
(INFORMAL ORAL RECOMMENDATIONS AND REPORTS)
TECHNICAL TERMINOLOGY
(VOCABULARY - TECHNICAL, ABBREVIATION)
COMPLETING REPORTS
PENMANSHIP

Duty D

Perform Basic Tests on Equipment

- 1 Perform continuity and resistance measurements
- 2 Apply power and install fuses
- 3 Routine and functional testing of equipment

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
<p>TEST RECEIVER (HEADSET WITH TEST PICKS) VOLTMETER TEST LIGHT FUSES SAFETY GLASSES EQUIPMENT AND APPARATUS SPECIFICATIONS DRAWINGS MANUALS LADDERS STOOLS LUBRICANTS ABRASIVE PAPERS FILES</p>	<p>IDENTIFY AND SELECT FUSES AND FUSING POSITIONS BASED ON A VARIETY OF CODING SYSTEMS THAT VARIES FROM SITUATION TO SITUATION i.e. 3 AG, MDL-3, 70 and 35 TYPE, ETC.</p> <p>SELECT TEST ACCESS POINTS TO DETERMINE PROPER VOLTAGES ON A VARIETY OF APPARATUS AND EQUIPMENT CONFIGURATIONS</p> <p>ANALYZE TROUBLE INDICATIONS TO MAKE DETAILED ENTRIES ON TEST RECORDS AND TROUBLE REPORTS</p>	<p>HAZARDOUS VOLTAGES AND CURRENTS LADDERS AND SCAFFOLDS</p>
SCIENCE	MATH -- NUMBLR SYSTEMS	COMMUNICATIONS
<p>RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL CURRENT</p>	<p>READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS</p> <p>GIVEN AN INSTRUMENT OF MEASURE, DETERMINE PRECISION AND/OR ACCURACY WITH RESPECT TO RELATIVE ERROR, TOLERANCE AND SIGNIFICANT DIGITS (VOLTAGE AND CURRENT MEASUREMENTS)</p>	<p>READING COMPREHENSION (BLUEPRINT & DRAWING COMPREHENSION)</p> <p>RECOMMENDATION REPORT - ORAL (INFORMAL ORAL RECOMMENDATIONS & REPORTS)</p> <p>TECHNICAL TERMINOLOGY (VOCABULARY - TECHNICAL; ABBREVIATION)</p> <p>COMPLETE REPORTS</p> <p>PENMANSHIP</p>

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
TEST RECEIVER - (HEADSET WITH TEST PICKS) VOLT METER TEST LIGHT SAFETY GLASSES FUSES EQUIPMENT AND APPARATUS SPECIFICATIONS DRAWINGS MANUALS LADDERS STOOLS SCHEMATICS TEST METHODS	RECOGNIZE AND IDENTIFY APPARATUS AND COMPONENTS BASED ON A VARIETY OF CODING SYSTEMS THAT VARIES FROM SITUATION TO SITUATION LOGICAL SEQUENCE OF CIRCUIT OPERATIONS APPLICATION OF ABSTRACT ELECTRONIC THEORY TO A BROAD RANGE OF CIRCUIT CONFIGURATIONS ANALYZE TROUBLE INDICATIONS TO MAKE DETAILED ENTRIES ON TEST RECORDS OR TROUBLE REPORTS	HAZARDOUS VOLTAGES AND CURRENTS LADDERS AND SCAFFOLDS
SCIENCE	MATH - NUMBER SYSTEMS	COMMUNICATIONS
RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL CURRENT MAGNETIC FIELDS OF FORCE TRANSFER OF ENERGY FROM ONE FORM TO ANOTHER (Example: POTENTIAL TO KINETIC.)	READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS GIVEN AN INSTRUMENT OF MEASURE, DETERMINE PRECISION AND/OR ACCURACY WITH RESPECT TO RELATIVE ERROR, TOLERANCE AND SIGNIFICANT DIGITS (VOLTAGE, CURRENT AND RESISTANCE MEASUREMENTS ONLY)	READING COMPREHENSION (BLUEPRINT AND DRAWING COMPREHENSION) RECOMMENDATION REPORT - ORAL (INFORMAL ORAL RECOMMENDATIONS AND REPORTS REPORTS) TECHNICAL TERMINOLOGY (VOCABULARY - TECHNICAL, ABBREVIATION) COMPLETING REPORTS PENMANSHIP INTERPRETING SCHEMATICS AND SYMBOLS, COMPREHENSION OF FUNCTIONAL AND CIRCUIT DESCRIPTION STATEMENTS

Duty E

Perform Complex Tests

- 1 Test circuit operations
- 2 Perform transmission and noise measurements
- 3 Perform current and power measurements

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
<p>Schematics Drawings Specifications Manuals Circuit description statement Test methods and procedures Voltmeters Ohmmeters Ammeters Frequency meter Attenuators Dummy loads Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc</p>	<p>Recognize and identify apparatus and components based on a variety of coding systems that vary from situation to situation Application of abstract electronic theory to a broad range of circuit configurations Logical sequence of circuit operations Analyze trouble indications to make detailed entries on test records or trouble reports Analyze and comprehend complex circuit operations and response capabilities to determine proper test access points and sequence of testing procedures and to determine if input/output responses fall within specified parameters Have a conceptual understanding and be able to apply the following principles: Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling—In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance FCC license where applicable</p>	<p>Hazardous voltages and currents Ladders and scaffolds</p>
SCIENCE	MATH — NUMBER SYSTEMS	COMMUNICATIONS
<p>Magnetic fields of force Transfer of energy from one form to another Resistance of materials to flow of electrical current</p>	<p>Read and interpret charts, tables and/or graphs Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance Manipulation of formula involving three factors [Ohm's Law] $I = \frac{E}{R}$$E = I \times R$$R = \frac{E}{I}$</p>	<p>Reading comprehension (Blueprint and drawing comprehension) Recommendation report—oral [Informal oral recommendations and reports] Technical terminology [Vocabulary-technical, abbreviations] Completing reports Penmanship Interpret schematics and symbols, comprehension of functional and circuit description statements</p>

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meters
Attenuators
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.
Oscilloscope, i.e., Tektronics, 545 or equivalent
Audio generators
RF Sig generators to 30 MHz (general application)
VU meters
RF power meters
Field strength meter
RF Sig generator to 500 MHz (for two-way radio)
Dummy load

SCIENCE

The electro-magnetic spectrum wave propagation
Magnetic fields of force
Transfer of energy from one form to another
Resistance of materials to flow of electrical current

PERFORMANCE KNOWLEDGE

Recognize and identify apparatus and components based on a variety of coding systems that vary from situation to situation
Logical sequence of circuit operations
Application of abstract electronic theory to a broad range of circuit configurations
Analyze trouble indications to make detailed entries on test records or trouble reports
Analyze and comprehend complex circuit operations and response capabilities to determine proper test access points and sequence of testing procedures and to determine if input/output responses fall within specified parameters
Have a conceptual understanding and be able to apply the following principles:
Phantom and simplex circuits, Metallic and non-metallic circuits; Earth potential compensation, Hybrid circuits, Phase shift, Impedance matching; Chain and sequential circuits; Signaling-In band, SF, etc.; Inductive and capacitive reactance.
Ohm's Law; Impedance
Conceptual application of the following topics:
Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, waveform frequency measurements
Interpret and apply the following terms: VSWR, 3m, dBm, dBw, dBv, dBm, dBa; VU; gain, loss; attenuation
FCC regulations and licenses where applicable

MATH - NUMBLR SYSTEI S

Read and interpret charts, tables and/or graphs
Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance
Ratio and proportion
Addition and subtraction of decimal fractions
Addition of positive and negative numbers
Manipulation of formula involving three factors
[Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

SAFETY -- HAZARD

Hazardous voltages and currents
Ladders and scaffolds
Hazard to delicate apparatus through the application of foreign or excessive voltages or currents

COMMUNICATIONS

Reading comprehension
[Blueprint and drawing comprehension]
Recommendation report--oral
[Informal oral recommendations and reports]
Technical terminology
[Vocabulary--technical, abbreviations]
Completing reports
Penmanship
Interpreting schematics and symbols, comprehension of functional and circuit description statements

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meter
Attenuators
Dummy loads
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.
Power/watt meter

SAFETY — HAZARD

Hazardous voltages and currents
Ladders and scaffolds
Radiation of microwave energy
Hazard to delicate apparatus through the application of foreign or excessive voltages or currents
Dangers associated with acids and caustic solutions
Explosion hazards—hydrogen from batteries being charged

PERFORMANCE KNOWLEDGE

Recognize and make a distinction between various types of storage batteries, i.e., lead-acid, ni-cad, carbon-zinc, etc.
Conceptual application of the following topics
Dissipation of heat; charge and discharge of secondary cells; Power; supplies—rectification; Filtering and regulation; Shunts and loads; Impedance matching
Analyze trouble indications to make detailed entries on test records or trouble reports
Have a conceptual understanding and be able to apply the following principles:
Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling—in band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
Conceptual application of the following topics:
Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
Interpret and apply the following terms: VSWR, dBm, dBu, dBw, dBv, dPrn, dBa, VU; gain; loss; attenuation
FCC regulation and licenses where applicable

SCIENCE

The electro-magnetic spectrum wave propagation
Magnetic fields of force
Transfer of energy from one form to another [batteries]
Resistance of materials to flow of electrical current [electrical conductors]

MATH — NUMBER SYSTEMS

Read and interpret tables, charts and/or graphs
Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance
Ratio and proportion
Addition and subtraction of decimal fractions
Addition of positive and negative numbers
Manipulation of formula involving three factors [Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

COMMUNICATIONS

Reading comprehension
[Blueprint and drawing comprehension]
Recommendation report—oral
[Informal oral recommendations and reports]
Technical terminology
Completing reports
Penmanship
Interpret schematics and symbols, comprehension of functional and circuit description statements

Duty F

Troubleshoot Equipment

- 1 Interpret trouble indicators
- 2 Locate malfunctioned apparatus or device
- 3 Make arrangements to maintain service
- 4 Set up and use test apparatus to make diagnostic tests to locate trouble
- 5 Repair or replace defective components, wire, etc.
- 6 Apply tests to determine if unit operates properly
- 7 Place unit back in service

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TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

PERFORMANCE KNOWLEDGE

SAFETY - HAZARD

TROUBLE REPORTS
ALARM/DISPLAY INDICATORS
TELETYPE UNIT
TELEPHONE

ALL OPERATING EQUIPMENT AND APPARATUS
INVOLVED WITH THE SYSTEM

DISCRIMINATE BETWEEN THE VARIETY OF TROUBLE
INDICATORS AND THE MAGNITUDE OF THEIR
IMPORTANCE AND URGENCY

IMPROPER INTERPRETATION OR LACK OF
RECOGNITION OF SYMBOLS OR CODING CAN
RESULT IN DAMAGE TO EQUIPMENT OR BE A
HAZARD TO PERSONNEL

SCIENCE

TRANSFER OF HEAT FROM ONE BODY TO ANOTHER.
[UNIT OVERHEATING]

RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL
CURRENT
[ELECTRICAL CONDUCTORS]

MATH - NUMBER SYSTEMS

READ AND INTERPRET CHARTS, TABLES
AND/OR GRAPHS

GIVEN A CODING SYSTEM, RECOGNIZE AND IDENTIFY
EACH UNIT INVOLVED BY ASSIGNING NECESSARY
SYMBOLS, NUMERICAL OR LITERAL

COMMUNICATIONS

RESPOND TO VERBAL INSTRUCTIONS
INTERPRET VISUAL AND AURAL INDICATORS
INTERPRET WRITTEN TROUBLE REPORTS
INTERPRET THE SOUNDS OF MALFUNCTIONING
EQUIPMENT AND DEVICES
INTERPRET VISUAL INDICATION OF MALFUNCTIONING
EQUIPMENT
MAKE A DISCRIMINATION CONCERNING EXCESSIVE
HEAT AND FOREIGN ODORS
COMMUNICATE WITH OTHERS COMPLETE SIMPLE
REPORTS
DETAILS AND INFERENCE; LOGIC; APPROPRIATE
DICTION, CLARITY OF EXPRESSION; USAGE;
SPELLING; TECHNICAL TERMINOLOGY; DICTATION;
ENUNCIATION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meter
Attenuators
Dummy loads
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltage and current instruments, status indicators, display panels, etc.
Trouble reports
Alarm/display indicators
Teletype unit
Telephone
All operating equipment and apparatus involved with the system
Transportation

PERFORMANCE KNOWLEDGE

Know strategy of conceptualizing the abstract relationships of parts of a circuit to the complete system for the purpose of establishing a logical sequence of operation
Recognize and identify each unit and circuit involved by assigned coding systems that use a variety of symbols and alpha-numeric abbreviations
Have a conceptual understanding and be able to apply the following principles:
Phantom and simplex circuits; Metallic and non-metallic circuits, Earth potential compensation, Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling-In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
Conceptual application of the following topics
Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
Interpret and apply the following terms: VSWR, dBm, dBo, dBw, dBv, dBm, dBa, VU, gain; loss, attenuation
FCC regulations and licenses where applicable

SAFETY — HAZARD

Hazard to service, equipment and personnel by incorrect identification of equipment or apparatus and circuit assignments

SCIENCE

Magnetic fields to force
Resistance of materials to flow of electrical current [electrical conductors]
Wave propagation
The electro-magnetic spectrum

MATH — NUMBER SYSTEMS

Read and interpret charts, tables and/or graphs
Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits tolerance
Manipulation of formula involving three factors [Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

COMMUNICATIONS

Reading comprehension [Blueprint and drawing comprehension]
Recommendation report—oral [Informal oral recommendations and reports]
Technical terminology [Vocabulary-technical; abbreviations]
Completing reports
Penmanship
Interpret schematics and symbols, comprehension of functional and circuit description statements

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meter
Attenuators
Dummy loads
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltage and current instruments, status indicators, display panels, etc
Trouble reports
Alarm/display indicators
Telephone
Teletype
Spare equipment and apparatus
Temporary cable and connectors
All operating equipment and apparatus involved with the system
Transportation

SCIENCE

Magnetic fields of force
Resistance of materials to flow of electrical current
[electrical conductors]
Wave propagation
The electro-magnetic spectrum

PERFORMANCE KNOWLEDGE

Know the strategy of conceptualizing the abstract relationship of parts of a circuit to the complete system for the purpose of establishing a logical sequence of operations
Recognize and identify each unit and circuit involved by assigned coding systems that use a variety of symbols and alpha-numeric abbreviations
Have a conceptual understanding and be able to apply the following principles:
Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits, Phase shift; Impedance matching; Chain and sequence circuits; Signaling-In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law, Impedance
Have a conceptual understanding of the electrical needs of the system and its demands on sub-systems, modules and components to facilitate the replacement or making of a choice of alternatives
Conceptual application of the following topics:
Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
Interpret and apply the following terms: VSWR, dBm, dBo, dBw, dBv, dBm, dBa; VU; gain; loss; attenuation
FCC regulations and licenses where applicable

MATH - NUMBER SYSTEMS

Read and interpret charts, tables and/or graphs
Given an instrument of measure, determine precision and/or accuracy, with respect to relative error, significant digits, and tolerance
Manipulation of formula involving three factors
[Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

SAFETY - HAZARD

Hazard to service, equipment and personnel by incorrect identification of equipment or apparatus and circuit assignments

COMMUNICATIONS

Reading comprehension
[Blueprint and drawing comprehension]
Recommendation report—oral
[Informal oral recommendations and reports]
Technical terminology
[Vocabulary-technical; abbreviations]
Completing reports
Penmanship
Interpret schematics and symbols, comprehension of functional and circuit description statements

(TASK STATEMENT) SET UP AND USE TEST APPARATUS TO MAKE DIAGNOSTIC TESTS TO LOCATE TROUBLE			
TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD	
<p>Schematics Drawings Specifications Manuals Circuit description statements Test methods and procedures Voltmeters Ohmmeters Ammeters Frequency meter Attenuators Dummy loads Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc Trouble reports Alarm/display indicators Teletype unit Telephone All operating equipment and apparatus involved with the system Power/watt meter</p>	<p>Know strategy of conceptualizing the abstract relationships of parts of a circuit to the complete system or the purpose of establishing a logical sequence of operations Recognize and identify each unit and circuit involved by assigned coding systems and alpha-numeric abbreviations Have a conceptual understanding and be able to apply the following principles: Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling-In band, SF, etc., Inductive and capacitive reactance; Ohm's Law, Impedance Make precision voltage, current, resistance and waveform measurements for the purpose of determining components malfunctioning or failure Conceptual application of the following trouble shooting techniques: Splitting/Isolation, Substitution/Frogging; Comparative measurements Conceptual application of the following topics Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements Interpret and apply the following terms: VSWR, dBm, dBu, dBw, dBv, dBm, dBa, VU; gain, loss; attenuation FCC regulations and licenses where applicable</p>	<p>Hazardous voltages and currents Ladders and scaffolds Hazards to delicate apparatus through the application of foreign or excessive voltages or currents Radiation of microwave energy</p>	
SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS	
<p>Magnetic fields of force Resistance of materials to flow of electrical current [electrical conductors] Transfer of energy from one form to another [batteries]</p>	<p>Read and interpret tables, charts and/or graphs Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance Ratio and proportion Addition and subtraction of decimal fractions Addition of positive and negative numbers Manipulation of formula involving three factors [Ohm's Law] $I = \frac{E}{R}$$E = I \times R$$R = \frac{E}{I}$</p>	<p>Respond to verbal instructions Interpret visual and aural indicators Interpret written trouble reports Interpret the sounds of malfunctioning equipment and devices Interpret visual indications of malfunctioning equipment Make a discrimination concerning excessive heat and foreign odors Communication with others, complete simple reports Details and inference; logic; appropriate diction; clarity of expression; usage; spelling; technical terminology; dictation; enunciation Reading comprehension [Blueprint and drawing comprehension] Recommendation report-oral [Informal oral recommendations and reports] Technical terminology [Vocabulary-technical; abbreviations] Completing reports Penmanship Interpret schematics and symbols, comprehension of functional and circuit description statements</p>	<p>66</p> <p>66</p>

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

MANUALS
DRAWINGS
CHARTS
SCREWDRIVERS
WIRE CUTTERS
PLIERS
SOLDERING IRONS
WIRE WRAPPING TOOLS
WRENCHES
ROPE AND CHAIN HOISTS
DRIFT PIN
BURNISHERS
CONTACT ADJUSTING TOOLS
CLEANING TOOLS
SAFETY GLASSES
LUBRICANTS

SAFETY -- HAZARD

HAZARDOUS VOLTAGES AND CURRENTS
LADDERS AND SCAFFOLDS
HAZARDS TO DELICATE APPARATUS THROUGH THE
APPLICATION OF FOREIGN OR EXCESSIVE
VOLTAGES OR CURRENTS
RADIATION OF MICROWAVE ENERGY
SOLVENT VAPORS

PERFORMANCE KNOWLEDGE

RECOGNIZE AND IDENTIFY APPARATUS AND
COMPONENTS BASED ON A VARIETY OF CODING
SYSTEMS THAT VARIES FROM SITUATION TO
SITUATION
LOGICAL SEQUENCE OF CIRCUIT OPERATIONS
APPLICATION OF ABSTRACT ELECTRONIC THEORY
TO A BROAD RANGE OF CIRCUIT CONFIGURATIONS
ANALYZE TROUBLE INDICATIONS TO MAKE DETAILED
ENTRIES ON TEST RECORDS OR TROUBLE REPORTS
CAREFULLY OBSERVE OR RECORD THE ORIGINAL
APPEARANCE AND LOCATION OF WIRES AND COM-
PONENTS TO ALLOW FOR RECALL SO THAT REPLACE-
MENT WILL CONFORM TO ORIGINAL CONFIGURATION
MAKE PRECISION VOLTAGE, CURRENT, RESISTANCE
AND WAVEFORM MEASUREMENTS TO DETERMINE
AND EVALUATE THE CORRECTIVE ACTION
FCC LICENSE WHERE APPLICABLE

SCIENCE

EFFECT OF HEATING AND COOLING ON EXPANSION OF
MATERIALS (CHANGE OF DIMENSIONS) (SOLDERING)
EFFECT OF HEATING-AND COOLING ON STATE OF MATTER
(CHANGE OF MATTER FROM ONE FORM TO ANOTHER)
(SOLDERING)
TRANSFER OF HEAT FROM ONE BODY TO ANOTHER
(SOLDERING)
SIMPLE MACHINES USED TO GAIN MECHANICAL
ADVANTAGE (Examples: LEVERS, GEARS, PULLEYS)
WORK INPUT, WORK OUTPUT, FRICTION AND EFFICIENCY
IN SIMPLE MACHINES

MATH -- NUMBER SYSTEMS

READ AND INTERPRET CHARTS, TABLES, AND/OR
GRAPHS
GIVEN AN INSTRUMENT OF MEASURE, DETERMINE
PRECISION AND/OR ACCURACY WITH RESPECT TO
RELATIVE ERROR, TOLERANCE AND SIGNIFICANT
DIGITS
GIVEN A CODING SYSTEM, RECOGNIZE AND IDENTIFY
EACH UNIT INVOLVED BY ASSIGNING NECESSARY
SYMBOLS, NUMERICAL OR LITERAL

COMMUNICATIONS

READING COMPREHENSION
(BLUEPRINT AND DRAWING COMPREHENSION)
RECOMMENDATION REPORT - ORAL
(INFORMAL ORAL RECOMMENDATIONS AND
REPORTS)
TECHNICAL TERMINOLOGY
(VOCABULARY - TECHNICAL, ABBREVIATION)
COMPLETING REPORTS
PENMANSHIP

TASK STATEMENT)	APPLY TESTS TO DETERMINE IF UNIT OPERATES PROPERLY			
TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD		
Schematics Drawings Specifications Manuals Circuit description statement Test methods and procedures Voltmeters Ohmmeters Ammeters Frequency meter Attenuators Dummy loads Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.	Recognize and identify apparatus and components based on a variety of coding systems that vary from situation to situation Logical sequence of circuit operations Application of abstract electronic theory to a broad range of circuit configurations Analyze trouble indications to make detailed entries on test records or trouble reports Have a conceptual understanding and be able to apply the following principles: Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits, Phase shift; Impedance matching; Chain and sequence circuits, Signaling--In band, SF, etc.; Inductive and capacitive reactance, Ohm's Law; Impedance Conceptual application of the following topics. Complex waveforms, noise, wave characteristics; dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements Interpret and apply the following terms. VSWR, dBm, dBo, dBw, dBv, dBa; VU, gain; loss; attenuation Perform functional tests and make adjustments so that operation conforms to the electrical and physical needs of the system Analyze and comprehend complex circuit operations and response capabilities to determine proper test access points and sequence of testing procedures and to determine if input/output responses fall within specified parameters FCC license where applicable	Hazardous voltages and currents Ladders and scaffolds Hazard to delicate apparatus through the application of foreign or excessive voltages or currents Radiation of microwave energy		
SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS		
Magnetic fields of force Transfer of energy from one form to another [relays and solenoids] Resistance of materials to flow of electrical current [electrical conductors]	Read and interpret charts, tables and/or graphs Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance Ratio and proportion Addition of positive and negative numbers Addition and subtraction of decimal fractions Manipulation of formula involving three factors [Ohm's Law] $I = \frac{E}{R}$ $E = I \times R$ $R = \frac{E}{I}$			

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meter
Attenuators
Dummy loads
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.
Trouble reports
Alarm/display indicators
Teletype unit
Telephone
All operating equipment and apparatus involved with the system
Transportation
Spare equipment and apparatus
Temporary cable and connectors

SCIENCE

Magnetic fields of force
Resistance of materials to flow of electrical current
[electrical conductors]
Wave propagation
The electro-magnetic spectrum

PERFORMANCE KNOWLEDGE

Know the strategy of conceptualizing the abstract relationships of parts of a circuit to the complete system for the purpose of establishing a logical sequence of operations
Recognize and identify each unit and circuit involved by assigned coding systems that use a variety of symbols and alpha-numeric abbreviations
Observe or record original appearance and location of wires and components to allow for recall so that replacement will conform to original configuration
Have a conceptual understanding and be able to apply the following principles:
Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling-In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
Conceptual application of the following topics:
Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
Interpret and apply the following terms: VSWR, dBm, dBo, dBw, dBv, dBm, dBa; VU; gain; loss; attenuation
FCC regulations and licenses where applicable

MATH — NUMBER SYSTEMS

Read and interpret tables, charts and/or graphs
Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance

Manipulation of formula involving three factors

[Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

SAFETY — HAZARD

Improper interpretation or lack of recognition of symbols or codes can result in damage to equipment or be a hazard to personnel
Hazard to delicate apparatus through the application of foreign or excessive voltages or currents
Radiation of microwave energy
Hazardous voltages and currents
Ladders and scaffolds

COMMUNICATIONS

Reading comprehension
[Blueprint and drawing comprehension]
Recommendation report—oral
[Informal oral recommendations and reports]
Technical terminology
[Vocabulary-technical; abbreviations]
Completing reports
Penmanship

Duty G

Perform Maintenance, Modification and Repair of Equipment

- 1 Inspect equipment
- 2 Clean and lubricate equipment
- 3 Adjust equipment
- 4 Repair and modify equipment

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

SCHEMATICS
DRAWINGS
SPECIFICATIONS
MANUALS
CIRCUIT DESCRIPTION STATEMENTS
TEST METHODS AND PROCEDURES
VOLTMETERS
OHMMETERS
AMMETERS
FREQUENCY METER
ATTENUATORS
DUMMY LOADS
SPECIAL TEST SETS WHICH REQUIRE THE MANIPULATION
OF COMPLEX KEYS, SWITCHES AND CONTROLS THAT
UTILIZE SENDING AND RECEIVING CIRCUITS.
VOLTAGES AND CURRENT INSTRUMENTS, STATUS
INDICATORS, DISPLAY PANELS, ETC.

PERFORMANCE KNOWLEDGE

MAKE PRECISION VOLTAGE, CURRENT, RESISTANCE
AND WAVEFORM MEASUREMENTS TO DETERMINE
PROPER OPERATIONS

MAKE CRITICAL VISUAL AND TACTILE
DISCRIMINATIONS OF CLOSE TOLERANCES
(i.e. 0.001 inch) WORN PARTS, DETERIORATING
INSULATION, LEVELS OF FLUID, SURFACE
CONDITIONS, DRIED LUBRICANTS

SAFETY - HAZARD

MOVING PARTS OF EQUIPMENT SUBJECT TO
REMOTE OR AUTOMATIC START

HAZARDOUS VOLTAGES AND CURRENTS

LADDERS AND SCAFFOLDS

SCIENCE

MAGNETIC FIELDS OF FORCE

TRANSFER OF ENERGY FROM ONE FORM TO ANOTHER.
(Example: POTENTIAL TO KINETIC)
[RELAYS AND SOLENOIDS]

RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL
CURRENT
[ELECTRICAL CONDUCTORS]

METALLURGY - CORROSION AND ELECTROLYSIS

MOTION RESULTING FROM TWO OR MORE FORCES
ACTING ON A POINT IN A BODY (Example: EQUAL
AND OPPOSITE FORCE IS APPLIED BY TWO BODIES
IN CONTACT WITH EACH OTHER
[MOTORS, RELAYS, SWITCHES, ETC.]

MATH - NUMBLR SYSTEMS

READ AND INTERPRET CHARTS, TABLES,
AND/OR GRAPHS

GIVEN AN INSTRUMENT OF MEASURE, DETERMINE
PRECISION AND/OR ACCURACY WITH RESPECT
TO RELATIVE ERROR, SIGNIFICANT DIGITS AND
TOLERANCE

COMMUNICATIONS

READING COMPREHENSION
[BLUEPRINT AND DRAWING COMPREHENSION]

RECOMMENDATION REPORT - ORAL
[INFORMAL ORAL RECOMMENDATIONS AND
REPORTS]

TECHNICAL TERMINOLOGY
[VOCABULARY - TECHNICAL; ABBREVIATION]

COMPLETING REPORTS

PENMANSHIP

INTERPRETING SCHEMATICS AND SYMBOLS,
COMPREHENSION OF FUNCTIONAL AND CIRCUIT
DESCRIPTION STATEMENTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

MANUALS
SPECIFICATIONS
PROCEDURE GUIDES
DUST CLOTHS
SOLVENTS
DUSTING BRUSHES
DETERGENTS
AIR GUN UP TO 30 p.s.i.
VACUUM CLEANER
LUBRICANTS
BRUSHES
LUBRICANT DISPENSERS

PERFORMANCE KNOWLEDGE

MAKE VISUAL AND TACTILE DISCRIMINATIONS OF
THE SURFACE CONDITIONS OF PARTS, ELECTRICAL
CONTACTS, TERMINALS, CABLES AND WIRES, ETC.
MAKE A VISUAL DISCRIMINATION OF THE AMOUNT OF
LUBRICANT APPLIED TO WEAR POINTS

SAFETY - HAZARD

HAZARDOUS VOLTAGES AND CURRENTS
LADDERS AND SCAFFOLDS
MOVING PARTS OF EQUIPMENT SUBJECT TO REMOVE
OR AUTOMATIC START
SOLVENT VAPORS
HAZARD TO DELICATE APPARATUS THROUGH THE
MISUSE OF CLEANING DEVICES

SCIENCE

CHEMISTRY - CHOICE OF SOLVENTS

MATH - NUMBLR SYSTEMS

LIQUID AND DRY MEASURES
(LIQUID ONLY)

COMUNICATIONS

READING COMPREHENSION
[BLUEPRINT AND DRAWING COMPREHENSION]
RECOMMENDATION REPORT - ORAL
[INFORMAL ORAL RECOMMENDATIONS AND
REPORTS]
TECHNICAL TERMINOLOGY
[VOCABULARY - TECHNICAL; ABBREVIATION]
COMPLETING REPORTS
PENMANSHIP

TASK STATEMENT) ADJUST EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

MANUALS
SPECIFICATIONS
PROCEDURE GUIDES
SCHEMATICS
SCREWDRIVER
TUNING TOOLS

PERFORMANCE KNOWLEDGE

MAKE CRITICAL VISUAL AND TACTILE MEASUREMENTS
AND ADJUSTMENTS
HANDLE AND USE DELICATE MEASURING INSTRUMENTS
IN SUCH A MANNER TO INSURE THEIR PRECISION
VERIFY THE PRECISION OF MEASURING INSTRUMENTS
BY CALIBRATION AND OTHER VALIDATION
TECHNIQUES

SAFETY - HAZARD

MOVING PARTS OF EQUIPMENT SUBJECT
TO REMOTE OR AUTOMATIC START
HAZARDOUS VOLTAGES AND CURRENTS
LADDERS AND SCAFFOLDS
HAZARD TO EQUIPMENT OR APPARATUS
THROUGH THE MISUSE OF ADJUSTING TOOLS

SCIENCE

RESISTANCE OF MATERIALS TO CHANGE IN SHAPE
(Examples: BENDING, TWISTING, STRETCHING)
[SPRING TENSION]

MATH - NUMBER SYSTEMS

READ AND INTERPRET CHARTS, TABLES, AND/OR
GRAPHS
GIVEN AN INSTRUMENT OF MEASURE, DETERMINE
PRECISION AND/OR ACCURACY WITH RESPECT TO
RELATIVE ERROR, TOLERANCE AND SIGNIFICANT
DIGITS
MEASURE OF TIME AND SPEED (Example: TIME-
SECONDS, MINUTES, ETC.; SPEED- FEET PER
MINUTE, R.P.M., ETC.)
[CONTACT CLOSURE, SPEED, SEQUENTIAL
SWITCHING]

COMMUNICATIONS

READING COMPREHENSION
[BLUEPRINT AND DRAWING COMPREHENSION]
RECOMMENDATION REPORT - ORAL
[INFORMAL ORAL RECOMMENDATIONS AND
REPORTS]
TECHNICAL TERMINOLOGY
[VOCABULARY - TECHNICAL; ABBREVIATION]
COMPLETING REPORTS
PENMANSHIP
INTERPRETING SCHEMATICS AND SYMBOLS,
COMPREHENSION OF FUNCTIONAL AND CIRCUIT
DESCRIPTION STATEMENTS

TOOLS, EQUIPMENT, MATERIALS,
OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meter
Attenuators
Dummy loads
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.
Charts
Screwdrivers
Wire cutters
Pliers
Soldering irons
Wire wrapping tools
Wrenches
Rope and chain hoists
Drift pin
Burnishers
Contact adjusting tools
Cleaning tools
Lubricants

SCIENCE

Effect of heating and cooling on expansion of materials (change of dimensions) (soldering)
Effect of heating and cooling on state of matter (changing of matter from one form to another) (soldering)
Transfer of heat from one body to another (soldering)
Simple machines used to gain mechanical advantage
Work input, work output, friction and efficiency in simple machines
Magnetic fields of force
Resistance of materials to flow of electrical current (electrical conductors)
Transfer of energy from one form to another (relays and solenoids)

PERFORMANCE KNOWLEDGE

Carefully observe or record the original appearance and location of wires and components to allow for recall so that replacement will conform to original configurations
Make precision voltage, current, resistance and waveform measurements to determine and evaluate the corrective action
Perform functional tests and make adjustments so that operation conforms to the electrical and physical needs of the system
Recognize and identify apparatus and components based on a variety of coding systems that vary from situation to situation
Logical sequence of circuit operations
Application of abstract electronic theory to a broad range of circuit configurations
Analyze trouble indications to make detailed entries on test records or trouble reports
Analyze and comprehend complex circuit operation and response capabilities to determine proper test access points and sequence of testing procedures and to determine if input output responses fall within specified parameter
Have a conceptual understanding and be able to apply the following principles: Phantom and simplex circuits; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling—in band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
Conceptual application of the following topics: Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
Interpret and apply the following terms: VSWR, dBm, dBo, dBw, dBv, dBm, dBa, VU; gain; loss; attenuation
FCC regulations and licenses where applicable

MATH — NUMBER SYSTEMS

Addition and subtraction of decimal fractions
Addition of positive and negative numbers
Ratio and proportion
Read and interpret tables, charts and/or graphs
Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance
Given a coding system, recognize and identify each unit involved by assigning necessary symbols, numerical or literal
Manipulation of formula involving three factors (Ohm's Law)

$$I = \frac{E}{R} \quad R = \frac{E}{I}$$

$$E = I \times R$$

COMMUNICATIONS

Reading comprehension (Blueprint and drawing comprehension)
Recommendation report—oral (Informal oral recommendations and reports)
Technical terminology (Vocabulary—technical, abbreviations)
Completing reports
Penmanship

SAFETY — HAZARD

Hazard to delicate apparatus through the application of foreign or excessive voltages or currents
Radiation of microwave energy
Hazardous voltages and currents
Ladders and scaffolds
Safety glasses